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Report for the Stage 3 in-depth review of emission inventories submitted under the UNECE LRTAP Convention and EU National Emissions Ceilings Directive for:

STAGE 3 REVIEW REPORT
UNITED KINGDOM

CONTENT

INTRODUCTION

1. The mandate and overall objectives for the emission inventory review process under the LRTAP Convention is given by the UNECE document '*Methods and Procedures for the Technical Review of Air Pollutant Emission Inventories reported under the Convention and its Protocols'* [(1)] – hereafter referred to as the 'Methods and Procedures' document.

2. This annual review has concentrated on SO_2, NOx, NMVOC, NH_3, plus PM_{10} & $PM_{2.5}$ for the time series years 1990 – 2014 reflecting current priorities from the EMEP Steering Body and the Task Force on Emission Inventories and Projections (TFEIP). HMs and POPs have been reviewed to the extent possible.

3. This report covers the Stage 3 centralised reviews of the UNECE LRTAP Convention and EU NEC Directive inventories of the United Kingdom coordinated by the EMEP emission centre CEIP acting as review secretariat. The review took place from 20th June 2016 to 25th June 2016 in Copenhagen, Denmark, and was hosted by the European Environment Agency (EEA). The following team of nominated experts from the roster of experts performed the review: Generalist – Ieva Sile (Latvia), Energy – Garmt Jans Venhuis (Netherlands), Transport – Jean-Marc Andre (France), Industry – Mirela Poljanac (Croatia), Solvents – Ardi Link (Estonia), Agriculture + Nature – Mette H Mikkelsen (Denmark), Waste – Katja Pazdernik (EC).

4. Kevin Hausmann was the lead reviewer. The review was coordinated by Katarina Marečková (EMEP Centre on Emission Inventories and Projections - CEIP).

[1] Methods and Procedures for the Technical Review of Air Pollutant Emission Inventories reported under the Convention and its Protocols. Note by the Task Force on Emission Inventories and Projections. ECE/EB.AIR/GE.1/2007/16 http://www.unece.org/env/documents/2007/eb/ge1/ece.eb.air.ge.1.2007.16.e.pdf

PART A: KEY REVIEW FINDINGS

5. The United Kingdom submitted full time series of air pollutant emissions reported in the most recent format of NFR tables (NFR 2014-2), containing all pollutants; the UNECE notification form, as well as an Informative Inventory Report of high quality. In addition, projections (scenario “with measures”) have been reported for the years 2020, 2025, and 2030.

6. All information was submitted within the particular timeframe set in the UNECE Reporting Guidelines.

7. The ERT notes that recalculations have been applied consistently and described thoroughly.

8. The 2016 submission constitutes an improvement on a number of issues highlighted in the previous Stage 3 review. Nevertheless, the ERT identified a need for further improvements regarding fuel used/sold.

9. The UK provided active support to the ERT during the 2016 centralised Stage 3 review, responding in a timely manner.

INVENTORY SUBMISSION

10. The inventory is in line with the EMEP/EEA emission inventory guidebook. However, it is only partly in line with the UNECE Reporting Guidelines regarding the emissions in the transport sector.

11. The ERT notes that the UK reports emissions from fuel used or kilometres driven in the transport sector. The UK explained to the ERT that the UK’s interpretation of the previous (ECE/EB.AIR/97) and current reporting Guidelines (ECE/EB.AIR/125) is that it allows the UK to report emissions for both compliance checking and reporting purposes on the basis of fuel used or kilometres driven only. Moreover, reporting emissions based on fuel sold can introduce irregularities in emissions time series for specific vehicle types and that can cause problems for policy makers. There is close agreement between bottom-up fuel consumption and total fuel sold in the UK, e.g. the differences are within 8% in 2014. This gives the UK reassurance that a fuel-used inventory would provide an appropriate and consistent basis to track AQ emission trends, input to wider AQ modelling and policy assessment.

12. The ERT notes that in Para 22 of the particular Guidelines it is mentioned that emissions from road vehicle transport should be calculated on the basis of fuel sold. In addition, parties may voluntarily calculate emissions from road vehicles based on fuel used or kilometres driven in the geographic area of the Party. The ERT considers the UK's approach to report transport emission on the basis of kilometres driven only as not in line with the reporting guidelines.

13. In its 2016 submission, the UK has provided a national inventory for the period 1990-2014 in NFR14 categories for all pollutants. For the following sectors,

emissions are reported: 1A1-1A5, 1B1, 1B2, 2A-2D, 2D, 2H, 2I, 2K, 3B, 3D, 5A-5E. No emissions are reported in sectors 2G, 2J, 2L, 3F, 3I.

14. The ERT commends the UK on improvements made since the last Stage 3 review in 2011. For example, the 2016 submission includes TSP emission estimates.

KEY CATEGORIES

15. In its 2016 IIR, the UK compiled and presented a key source analysis (both level and trend assessment) for the following pollutants for the year 2014: NOx, NMVOC, SOx, NH_3, CO, TSP, PM_{10}, $PM_{2.5}$, Pb, Hg, Cd, PCDD/PCDF, PAH, HCB.

16. The KCA shows that the energy sector dominates the emissions of SO_x, CO, TSP, PM_{10}, $PM_{2.5}$, Hg, Cd, PCDD/PCDF and PAH, the transport sector generates most of the NOx emissions, while NMVOC emissions are generally emitted in the IPPU and solvents sector. Pb emissions are mainly produced in the IPPU (Metal industry) sector. With regard to NH_3 and HCB (from the use of pesticides) emissions from agriculture are the largest contributor.

17. The KCA performed by the UK is consistent with the EMEP/EEA emission inventory guidebook for all reported pollutants of 2014. Changes in sectoral shares from 1990 to 2014 are also presented and explained in detail in Chapter 2 “UK Emission Trends for key sources”.

QUALITY

Transparency

18. The UK uses the notation keys NE and IE in a few areas, and provides explanations for particular notation keys in Chapter 1.8 “Assessment of Completeness” in 2016 IIR.

19. The ERT commends the UK on its transparent and detailed IIR. The IIR generally follows the recommended structure (Annex II of the Reporting Guidelines). Each sector is covered in chapters, which present both activity data and emission factor sources, as well as the method used. However, the description of IPPU sources and emissions could be more detailed.

Completeness

20. The Party's inventory for the pollutants reviewed is considered to be generally complete. There are sources (e.g. railways) for which some of the pollutants have not been estimated: However, the UK plans to estimate these emissions in the future.

Consistency, including recalculations and time-series

21. Sector specific recalculations and improvements are described within each of the relevant chapters. There is also a separate chapter, “Recalculations and

Methodology Changes", where the impact of changes on the emission totals is summarised and the biggest changes for each pollutant are highlighted.

Comparability

22. The UK reports emissions from fuel used or kilometres driven in the transport sector. The ERT considers this approach as seriously hampering comparability. Therefore, it recommends that the UK reassesses this approach.

23. The ERT also observed that the UK have chosen to put emissions from tobacco and fireworks into 6A, not 2D3i/2G as stated in EMEP/EEA 2013 Guidebook. The UK responded during the review that they would check the allocation of these two sources. The guidebook under sector 6A does state that 'Also, the contribution of this source category is thought to be insignificant, i.e. less than 1 % of the national emissions of any pollutant'. Although emissions from cigarette smoking and fireworks are considered insignificant in the UK, the ERT recommends to put the particular emissions under the corresponding subcategories, as the information about tobacco and fireworks is available as part of the IPPU sector in the EMEP/EEA 2013 Guidebook.

CLRTAP/NECD comparability

24. For the UK, there are no differences between emissions submitted under CLRTAP and NECD starting with 2010. The UK did not update its emission reporting under the NECD for earlier years. For reasons of transparency and comparability, the ERT recommends that the UK reports full time series under the NECD.

Accuracy and uncertainties

25. An uncertainty analysis was carried out by the UK using Tier 1 and Monte-Carlo method. The results are presented and described in Chapter 1.7 "Uncertainty Evaluation". It is mentioned in the UK's 2016 IIR that uncertainty results are used to plan the programme of inventory improvement.

Verification and quality assurance/quality control approaches

26. The ERT commends the UK on having a comprehensive QA/QC and verification procedures and description. The UK inventory QA/QC system complies with Tier 1 requirements and in addition, there are a range of source-specific (Tier 2) QA/QC measures within the UK system which are typically applied to the most important "key categories" and/or where complex estimation methods (Tier 2-3) are applied. Sector-specific checks are also documented in the IIR.

27. The ERT commends the UK for having the external reviews and bilateral reviews with other inventory teams to improve the inventory quality.

FOLLOW-UP TO PREVIOUS REVIEWS

28. The UK has improved its inventory since the last Stage 3 review in 2011. The ERT acknowledges that some of the recommendations have been taken into account, and commends the UK on the great effort made to improve its inventory. However, the ERT recommends that the UK reassesses the fuel sold/fuel used issue to be in line with the Reporting Guidelines.

AREAS FOR IMPROVEMENTS IDENTIFIED BY THE UNITED KINGDOM

29. The UK identifies several areas for improvement in its IIR:

30. In the transport sector, the most significant change is planned for the shipping sector 1A3d as a consequence of an improvement programme currently in progress that will use detailed AIS vessel movement data captured around the UK coast for 2014. As well as enhancing activity data and emission factors for better spatial representation of the emissions, this work will also provide a better estimate of total UK domestic and international shipping emissions using a bottom-up activity-based method. For railways, the UK will include emissions of NH_3 and PAHs currently not estimated.

31. The NMVOC sources in the NFR14 sector "2D3" are a priority area for improvement in the IPPU sector.

32. Regarding the waste sector, several improvements are planned: identify a mechanism for an annual update of the data on landfill gas flaring volumes from sites other than those regulated by the Environment Agency/SEPA/NRW; review the assumed quantity of waste to landfill; improve the activity data for anaerobic digestion and update NH_3 emissions with possible new emission factors.

PART B: RECOMMENDATIONS FOR IMPROVEMENTS TO THE PARTY

CROSS CUTTING IMPROVEMENTS IDENTIFIED BY THE ERT

33. The ERT identifies the following cross-cutting issues for improvement:

(a) The ERT encourages the UK to put more detail in the description of IPPU sources and emissions.

(b) The ERT considers the UK's approach to estimate the emissions from the transport sector to be not comparable and recommends that the Party reassesses its approach.

(c) The ERT recommends that the UK reports full time series also under the NECD.

(d) The ERT recommends to reallocate emissions from tobacco and fireworks to 2D3i/2G.

(e) The ERT recommends that the UK reviews its use of notation keys. In the NFR tables, in several cells “NO” is reported (for example, in sector 2C), although emissions are reported in the same sub-sector. This is not in accordance with the Reporting Guidelines, which state that “NO” is used “for categories or processes within a particular source category that do not occur within a Party”. ERT recommends that the UK corrects these notation keys.

SECTOR SPECIFIC RECOMMENDATIONS FOR IMPROVEMENTS IDENTIFIED BY ERT

ENERGY

Review Scope

Pollutants Reviewed		All pollutants		
Years		1990 – 2014		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
1A1a	Public electricity and heat production	x		x
1A1b	Petroleum refining	x		
1A1c	Manufacture of solid fuels and other energy industries	x		
1A2a	Iron and steel	x		
1A2b	Non-ferrous metals	x		x
1A2c	Chemicals	x		x
1A2d	Pulp, Paper and Print	x		x
1A2e	Food processing, beverages and tobacco	x		x
1A2f	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	x		
1A2gviii	Stationary combustion in manufacturing industries and construction: Other	x		
1A3ei	Pipeline transport	IE		
1A3eii	Other	x		
1A4ai	Commercial/institutional: Stationary	x		x
1A4bi	Residential: Stationary	x		
1A4ci	Agriculture/Forestry/Fishing: Stationary	x		
1A5a	Other stationary (including military)	IE		x
1B1a	Fugitive emission from solid fuels: Coal mining and handling	x		x
1B1b	Fugitive emission from solid fuels: Solid fuel transformation	x		
1B1c	Other fugitive emissions from solid fuels	IE		x
1B2ai	Fugitive emissions oil: Exploration, production, transport	x		
1B2aiv	Fugitive emissions oil: Refining / storage	x		x
1B2av	Distribution of oil products	x		x
1B2b	Fugitive emissions from natural gas (exploration, production, processing, transmission, storage, distribution and other)	x		
1B2c	Venting and flaring (oil, gas, combined oil and gas)	x		x
1B2d	Other fugitive emissions from energy production	x		x

General recommendations on cross-cutting issues

Transparency

34. The ERT finds that the United Kingdom has provided a detailed and generally transparent emissions inventory. Estimates are provided at the most detailed level for all energy sectors. The reported methodology and emission factors in the IIR are considered by the ERT to be transparent and well described per sub-sector. The UK clearly explains the trends for each key source in the IIR. The ERT encourages the United Kingdom to continue with this level of detail when describing emission trends and the drivers for changes in emissions. The ERT also encourages the UK to maintain the present level of transparency in future emissions.

Completeness

35. The ERT considers the energy sector to be complete and comprehensive with good levels of detail in the methodology descriptions. The ERT commends the UK for including emissions for TSP as recommended in the previous review, as well as completing the time series. The ERT also commends the UK for the limited use of notation keys in the NFR tables.

Consistency including recalculation and time series

36. The time series are in general consistent for the energy sector. The UK has justified all identified outliers. The ERT commends the UK for clearly explaining the main recalculations and presenting them per sub-sector. All recalculations are sufficiently justified and resulted in real improvements of the inventory.

Comparability

37. The ERT notes that the inventory of the UK is comparable with those of other reporting parties. The ERT commends the UK for using methodologies in accordance with the EMEP/EEA 2013 Guidebook for the energy sector and for providing complete NFR tables with a minimal use of notation keys. The allocation of source categories follows that of the EMEP/UNECE Reporting Guidelines. The ERT encourages the UK to continue providing comparable inventory data.

Accuracy and uncertainties

38. The ERT commends the UK for the high-tiered methods (tier 2 and 3) used for many of the identified key categories. The ERT encourages United Kingdom to continue estimating its uncertainties using this approach and to maintain its high-tier methodologies for key categories.

39. The ERT notes that the QA/QC procedures are clearly explained in the IIR including energy-specific checks and verification. The ERT encourages the UK to continue explaining the various QA/QC procedures used and developed.

Improvement

40. The IIR provides clear and concise details of improvements planned for the energy sector, both in a general paragraph as well as per sub-sector. The ERT encourages the United Kingdom to continue with the documentation of planned improvements in this way.

Sub-sector Specific Recommendations

Category issue 1: Additional heavy metals

41. The ERT noticed that the UK has included values for most heavy metals (HM) in the NFR and that in the CLRTAP key source analysis table all HM are included. In the IIR key source analysis table, however, only Pb, Cd and Hg are included and in the NFR sector 1A4ai is not designated as key source for Ni. The ERT asked the UK to provide additional information on why the additional HMs were not included in the IIR. During the review week, the UK responded that due to finite resources only in-depth information on key sources of the main pollutants, particulate matter, CO, persistent organic pollutants, and priority heavy metals were included. The ERT encourages the UK to include additional heavy metals in future submissions to improve completeness of the inventory.

Category issue 2: Waste incineration with energy recovery

42. The UK states in its IIR and NFR that activity data and emissions from waste incineration is IE, and probably so in sector 1A1 because of the energy recovery. However, it is not clear how much is used and emitted. The ERT asked the UK to provide the ERT with additional and more specific information on where and how much waste is used as fuel, and where and how much it contributed to the emissions. During the review week, the UK uploaded a file with additional data. The ERT thanks the UK for their quick response and encourages the UK to include this information in future submissions of the IIR and NFR to improve transparency.

Category issue 3: 1A2b, 1A2c, 1A2d, 1A2e – Activity data

43. The ERT noticed that the UK used the notation key IE for activity data of biomass and other fuels for the sectors 1A2b, 1A2c, 1A2d and 1A2e, but that no explanation is given on where these fuels are included. The ERT asked the UK to provide additional information on quantities and where these fuels are included. During the review week, the UK explained that UK energy statistics currently grouped all biomass use by industry together as ‘unspecified industry’ and that it was all reported in category 1A2gviii. The ERT encourages the UK to review the data and to try to specify activity data per category in order to improve transparency.

Category issue 4: 1A5 – All pollutants

44. The ERT notes that the UK has included the emissions from sector 1A5a (Other stationary) in 1A5b (Other mobile). The ERT encourages the UK to report stationary and mobile sources separately in their own respective sectors, in order to improve transparency.

Category issue 5: 1B1a – NMVOC, TSP, $PM_{2.5}$ and PM_{10}

45. The ERT noticed that no emissions were calculated for sector 1B1a, although activity data are provided for this sector in the NFR and Tier 1 emission factors are given for NMVOC, TSP, $PM_{2.5}$, and PM_{10} in the EMEP/EEA 2013 Guidebook. The ERT asked the UK to provide information on why these factors were not used to calculate emissions and why NE or NA was used in the NFR table instead. During the review week, the UK responded that sector 1B1a was used for reporting of emissions of methane from coalmines only. The UK will review the factors in the Guidebook for NMVOC and consider whether to include an emission estimate for NMVOC from this source in the future. Emissions of particulate matter from mines and quarries are reported in the UK inventory under 2A5a, so to include figures here as well might introduce duplication. The ERT encourages the UK to follow up on this intention or to include it under the planned improvements in future submissions.

Category issue 6: 1B1c – Activity data

46. The ERT notes that the UK uses IE for most pollutants (included in 1B1b), but uses NA for all (but one) activity data. The ERT encourages the UK to include activity data in the same category as the emissions and to report IE for AD as well.

Category issue 7: 1B2aiv

47. The ERT noticed that no emissions were calculated for sector 1B2aiv, although activity data are provided for this sector in the NFR and Tier 1 emission factors are given for most pollutants in the EMEP/EEA 2013 Guidebook. The ERT asked the UK to provide information on why these factors were not used to calculate emissions and why NE or NA was used in the NFR table instead, apart from NMVOC and NH3. During the review week, the UK responded that this category was only used for fugitive emissions from refinery processes, and that reporting was limited to emissions of organic pollutants (methane, NMVOC, benzene) from fugitive sources such as leakage from valves, tanks, and drainage systems. Sector 1B2aiv was also used for ammonia, which is believed to be released from both combustion and process sources. Emissions of metals, particulate matter, NO_X, SO_x, etc. result from combustion rather than being a result of fugitive releases (or at least primarily from combustion), and all emissions of these pollutants (including emissions from combustion of catalyst coke in cat crackers) are included in the UK inventory as energy sources (1A1b). The ERT thanks the UK for its response and encourages the UK to include this additional information in future submissions to improve transparency.

Category issue 8: 1B2aiv, 1B2av – SO_x

48. The ERT notes that the UK has provided emissions for NMVOC and NH_3 for the categories 1B2aiv and 1B2av, but uses IE for SO_x. The ERT encourages the UK to report these emissions in their own respective sectors, in order to improve transparency.

Category issue 9: 1B2c – Activity data

49. In the NFR the amount of gas in NFR sector 1B2c (Venting and flaring) is put as confidential, but emissions are given in the NFR table. The ERT asked the UK to provide the ERT with additional and more specific information on this subject. During the review week, the UK responded that the confidential marking was wrong – flaring data was available. The Party uploaded a file with additional data. In the case of venting, the UK does not have any activity data since the emission estimates are based on emissions data supplied by the operators. The ERT thanks the UK for their response and encourages the UK to include this information in future submissions of the IIR and NFR to improve transparency.

Category issue 10: 1B2d

50. The ERT noticed that the UK does not provide any information on geothermal energy (exploration or production) in the IIR nor the NFR tables. The ERT asked the UK to confirm that geothermal energy is indeed not an issue in the UK, or to provide the ERT with additional information on why this is not included. During the review week, the UK responded that geothermal energy was exploited in the UK on a very small-scale only, with only one relatively small scheme known– the Southampton District Energy Scheme. The Party explained that the fossil fuels used in the conventional boilers also on that site would be covered in the inventory, but that they were not aware of any potential for any other significant emissions from the geothermal energy process on this site. There is no separate government statistics on geothermal energy (it is grouped with other forms of energy in the Digest of UK Energy Statistics), but the total energy output from the Southampton site is believed to be roughly 0.25 PJ per year (which will include some energy from fossil fuels). The ERT encourages the UK to include this information in future submissions of the IIR and NFR to improve completeness and transparency.

TRANSPORT

Review Scope

Pollutants Reviewed		All pollutants		
Years		1990 – 2014		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
1A2gvii	Mobile Combustion in manufacturing industries and construction	x		
1A3ai(i)	International aviation LTO (civil)	x		
1A3ai(ii)	International aviation cruise (civil)	x		
1A3aii(i)	Domestic aviation LTO (civil)	x		
1A3aii(ii)	Domestic aviation cruise (civil)	x		
1A3bi	Road transport: Passenger cars	x		
1A3bii	Road transport: Light duty vehicles	x		
1A3biii	Road transport: Heavy duty vehicles and buses	x		
1A3biv	Road transport: Mopeds & motorcycles	x		
1A3bv	Road transport: Gasoline evaporation	x		
1A3bvi	Road transport: Automobile tyre and brake wear	x		
1A3bvii	Road transport: Automobile road abrasion	x		
1A3c	Railways	x		x
1A3di(ii)	International inland waterways	x		x
1A3dii	National navigation (shipping)	x		
1A4aii	Commercial/institutional: Mobile		IE	
1A4bii	Residential: Household and gardening (mobile)	x		
1A4cii	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	x		
1A4ciii	Agriculture/Forestry/Fishing: National fishing	x		
1A5b	Other, Mobile (including military, land based and recreational boats)	x		
1A3di(i)	International maritime navigation	x		
1A3	Transport (fuel used)	x		

General recommendations on cross-cutting issues

Transparency

51. The UK provided a very detailed and generally transparent transport emissions inventory. Estimates are provided at the most detailed level for all transport sectors. The UK's methodology and emission factors in the IIR are considered by the ERT to be transparent and generally well described. The ERT encourages the UK to include more detail in the IIR including further explanations of HCB emissions factors (road transport sector), the trends in emissions due to catalyst replacement, and lead content in fuels (especially after 2000).

Completeness

52. The ERT considers the transport sector to be complete and comprehensive with good levels of detail in the methodology descriptions.

Consistency including recalculation and time series

53. The ERT considers the time series to be consistent. No outliers have been identified. The UK explained and sufficiently justified the recalculations in the IIR.

Comparability

54. The ERT notes that the UK transport inventory is not comparable with those of other reporting parties. As already noted during the previous review, the UK's emission estimates are reported based on fuel used and not fuel sold. The ERT refers to Part A of this review report for details and recommendations.

Accuracy and uncertainties

55. The UK uses Tier 2/3 methodologies for all sub-sectors. The UK provided a quantitative uncertainty analysis and reported on how its uncertainty analysis is used to prioritise further improvements in the inventory. The QA/QC procedures are consistent with good practice. The UK is regularly reviewed by external reviewers (UNFCCC, bilateral, etc.). The ERT commends the UK for providing such a detailed and accurate submission.

Improvement

56. The ERT notes the UK's intention to improve the navigation sector with the use of AIS data (bottom-up calculation) and estimation of PAH and NH_3 emissions in railways. The ERT encourages the UK to implement the planned improvements.

Sub-Sector Specific Recommendations

Category issue 1: 1A3c Railways - NH_3

57. The ERT notes that the UK is using the "NE" notation key although the EMEP/EEA Guidebook provides Tier 2 emission factors. The UK answered during the review that they were aware of the gap and planned to add emissions in the next inventory. The ERT encourages the UK to apply this planned improvement in the next submission.

Category issue 2: 1A3di(ii), International inland waterways

58. The ERT notes that the "NA" and "IE" notation keys are used in the NFR tables, whereas it is explained in the IIR that the emissions from this sector are estimated by using a Tier 3 methodology. During the review the UK stated that there were no international inland waterway emissions and that all inland waterway emissions in the UK fell under domestic and that they were reported under 1A3dii. The UK would amend the notation key for 1A3di(ii) to "NO" (not occurring) for all

relevant pollutants in its next submission. The ERT encourages the UK to continue improving the inventory and its use of notation keys.

INDUSTRIAL PROCESSES

Review Scope

Pollutants Reviewed		All pollutants		
Years		1990 – 2014		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
2A1	Cement production	x		x
2A2	Lime production	x		x
2A3	Glass production	x		x
2A5a	Quarrying and mining of minerals other than coal	x		
2A5b	Construction and demolition	x		x
2A5c	Storage, handling and transport of mineral products		NA	
2A6	Other mineral products	x		x
2B1	Ammonia production	x		x
2B2	Nitric acid production	x		
2B3	Adipic acid production	x		x
2B5	Carbide production		NO	
2B6	Titanium dioxide production	x		x
2B7	Soda ash production	x		x
2B10a	Chemical industry: Other	x		
2B10b	Storage, handling and transport of chemical products	x		
2C1	Iron and steel production	x		x
2C2	Ferroalloys production	x		x
2C3	Aluminium production	x		x
2C4	Magnesium production	x		x
2C5	Lead production	x		
2C6	Zinc production	x		
2C7a	Copper production	x		
2C7b	Nickel production	x		
2C7c	Other metal production	x		x
2C7d	Storage, handling and transport of metal products		NE	
2D3b	Road paving with asphalt	x		x
2D3c	Asphalt roofing		NE	
2H1	Pulp and paper industry	x		x
2H2	Food and beverages industry	x		x
2H3	Other industrial processes	x		x
2I	Wood processing	x		x
2J	Production of POPs		NO	
2K	Consumption of POPs and heavy metals (e.g. electrical and scientific equipment)	x		x
2L	Other production, consumption, storage, transportation or handling of bulk products		NA	

General recommendations on cross-cutting issues

Transparency

59. The UK provided a detailed and generally transparent emissions inventory. The estimates reported for the key sources of the industrial sector come with good method descriptions and references of data sources. The IIR and the NFR tables are transparent. The information contained in the IIR is detailed enough for key categories and the methods used are described in such way that enables reviewers to fully assess underlying assumptions and the rationale for choices of data, methods and other inventory parameters. Trends are not always described transparently, as the reasons for dips and jumps are not always given.

Completeness

60. The ERT considers the industry sector to be complete and comprehensive, but the proper level of detail in the methodology descriptions is given only for key sources. The method descriptions for all other sources are missing and are recommended to be included in future submissions.

61. All important sources are included in the inventory. However, for the source category 2.D.3.c Asphalt roofing, the UK uses the notation key NE although it is likely to be an emitting source.

Consistency including recalculation and time series

62. The time series for the industrial sector are generally consistent. The ERT has identified some outliers and provides detailed information in the respective sector in the Sub-sector Specific Recommendations. The UK justified all identified outliers.

63. The recalculations are sufficiently justified and resulted in real improvements of the inventory.

Comparability

64. The inventory of the UK is comparable with those of other reporting parties. The ERT commends the UK for using methodologies in accordance with the EMEP/EEA Guidebook for the industry sector and for providing complete NFR tables. However, the use of notation keys for activity data reporting in the NFR tables is substantial. The allocation of source categories follows that of the EMEP/UNECE Reporting Guidelines.

65. The ERT found one possible underestimation in NFR 2.A.1 regarding particulate fractions when comparing the submitted data with the ones from the other reporting Parties. The details on this issue are presented in the Sub-sector Specific Recommendations.

Accuracy and uncertainties

66. The UK has implemented general QA/QC procedures for most processes in the industrial sector. For selected categories (e.g. 2.A, 2.B, and 2.C), the UK established some additional QA/QC procedures.

67. The UK evaluates the uncertainty using a Tier 1 uncertainty analysis. The recent Tier 1 assessment was undertaken for several key pollutants while an analysis of a more comprehensive list of pollutants is planned for the future. The UK uses the results of the uncertainty analysis to plan the programme of inventory improvement. Uncertainties for the industrial processes are presented in the IIR.

Improvement

68. Improvements for the industrial sector are planned and very well elaborated in the IIR. However, the ERT identified a number of places in need for additional improvements and this will be elaborated in the Sub-sector Specific Recommendations.

Sub-sector Specific Recommendations

Category issue 1: 2A1 Cement production

69. The ERT noted that the UK reported activity data on clinker production in its CRF tables to the UNFCCC, while in the NFR tables this data is marked confidential. During the review, the UK explained that clinker production data for the UK are confidential, and that, in the CRF, the Party submitted clinker production data for Great Britain only (i.e. excluding Northern Ireland), since these data are not confidential. The UK stated that they were able to provide reviewers with the GB-wide activity data if that was required and even submit this data in the CLRTAP table in the future. The ERT commends the UK for providing a clear explanation and recommends to include all data that are not confidential (data for the GB) and to provide an explanation of this issue in the IIR.

70. During the review week, the ERT found that the UK estimates emissions of TSP, PM10, and PM2.5, but not emissions of BC. Since EFs are available in the EMEP/EEA Guidebook, the ERT recommends that the UK estimates and includes emissions of BC in the next submission. The UK stated that this aspect of its inventory would be reviewed and appropriate action would be taken in time for the next submission.

71. The ERT noticed that reported time series emissions of TSP, PM10 and PM2.5 are very small when compared with other obligated parties (in respect of the number of facilities and clinker / cement production per year). The ERT asked the UK on how the Party could be sure that reported emissions were not underestimated and that estimates included all activities regarding all sub-processes within the cement industry from inputting raw materials to the final shipment of the products off site. Additionally, the ERT noted that there is no activity data nor emission factors reported, which would allow the ERT to perform checks and asked for information on

implemented abatement technologies. The UK provided the ERT with data on clinker production for Great Britain for the period 2008-2014, and informed the ERT that emission estimates are based on the data reported by the operators themselves for inclusion in the European Pollutant Release and Transfer Register (E-PRTR) and in similar inventories maintained by UK regulators. The UK also stated that these data will be reviewed by the regulators and are expected to cover all emissions from the cement works. The UK additionally provided information on abatement technologies in the cement production sector: all UK sites have electrostatic precipitators and/or fabric filters to abate dust emissions from kilns, raw mills, fuel mills and clinker coolers. The ERT recommends that the UK checks with the UK regulators about inclusion of fugitive sources and emissions resulting from the handling and processing of the product and raw materials from each of the sites and their abatement technologies. The ERT wants to highlight that emissions of particulate fractions from source category 2.A.1 also include the additional emissions resulting from the handling and processing of the product and raw materials according to the EMEP/EEA Guidebook.

72. The ERT asked the UK for a more detailed analysis of the PM2.5, PM10, and TSP time series. The UK provided a comprehensive explanation of emission trends and the ERT commends the UK for that. The ERT recommends that the UK includes all provided information in the IIR to ensure comparability, transparency and better understanding on time series for the next submission in 2017.

Category issue 2: 2A2 Lime production

73. The ERT found that emissions of PM2.5, PM10, TSP, and BC from lime production activities are not reported but the activity data are. The UK explained that emissions from both fuel combustion and processes at limekilns are currently reported in 1.A.2.f, and that they do not produce separate estimates for the fuel combustion and process elements of these emissions so they have to either be reported in 1.A.2.f or 2.A.2. The ERT recommends that the UK follows the EMEP/EEA guidelines and reports all emissions of particulate fractions in the source category 2.A.2, and emissions of all other pollutants in 1.A.2.f for the next submission in 2017.

Category issue 3: 2A3 Glass production

74. The ERT asked the UK for a better explanation of the PM2.5, PM10, BC, TSP, PCDD/PCDF and heavy metals emission trends. The UK provided a comprehensive explanation of those emission trends. The ERT recommends that the UK includes all provided information in the IIR to ensure comparability and transparency for the next submission in 2017.

Category issue 4: 2A5b Construction and demolition

75. The ERT notes that there is no information on activity data for the construction sector and that the UK uses the notation key C. Additionally, there is no information on the methodology used for emission calculation in the IIR. The ERT sees no reason for the confidentiality of information on the total floor space

constructed/demolished [m3]. The UK provided the ERT with information on the methodology used and stated that they will review this issue and will release activity data in future submissions if possible. The ERT recommends that the UK collects and reports data on total floor space constructed/demolished [m3] for the period 1990 - 2014 in the future.

Category issue 5: 2A6 Other mineral products

76. The ERT asked the UK for a better explanation of the NMVOC emission trend. The UK provided a comprehensive explanation for emission trends and the ERT recommends that the UK includes all provided information in the IIR.

Category issue 6: 2B1 Ammonia production

77. The ERT noted that the activity data for ammonia production are confidential in the NFR tables, while at the same time those data are submitted in the CRF tables to the UNFCCC. The UK provided the ERT with an explanation for this issue and it seems to be a mistake in the submissions since data should either be included in both sets of tables, or excluded from both. The ERT recommends that the UK reports time series ammonia production data in the NFR tables on the aggregated level for the next submission in the 2017.

Category issue 7: 2B3 Adipic acid production

78. The ERT found that activity data for adipic acid production are confidential and the notation key "C" is used for the full time series, while the notation key "NA" is used for emission data. Additionally, in the CRF tables submitted to the UNFCCC the notation key "NO" is used for adipic acid production. The ERT recommends that the UK revises its use of notation keys for this source category and ensures the consistency between NFR and CRF reporting tables.

Category issue 8: 2B6 Titanium dioxide production and 2B7 Soda ash production

79. The ERT found that activity data for 2.B.6 and 2.B.7 are confidential in the NFR tables. However, activity data for titanium dioxide and for soda ash production are officially submitted in the CRF tables to the UNFCCC. The UK provided the explanation that there are only two sites manufacturing each of these chemicals and any data they have are provided on a confidential basis. The UK also noted that the figures in the CRF are nominal production only, i.e. estimates of the total capacity of the sites in operation and not the actual production. The ERT commends the UK for providing this explanation.

Category issue 9: 2C1 Iron and steel production

80. During the review, the ERT asked the UK to provide activity data on a dis-aggregated level for each of the 8 activities in the scope of iron and steel production mentioned in the IIR (except for sinter production, which is confidential). In addition, the ERT asked for information on the methodology used for rolling of steel and an explanation for the activity data used, i.e. solid fuel used and steel produced. The UK

provided the ERT with activity data for blast furnaces, basic oxygen furnaces, electric arc furnaces, hot & cold rolling of steel, and flaring of blast furnace gas. The UK did not provide any information on solid fuels as activity data in this part of the industrial sector. The ERT recommends that the UK revises fuels as activity data in NFR 2.C.1 Iron and steel production and reports fuels in the part of the energy sector 1.A.2.b as proposed in the EMEP/EEA Guidebook.

Category issue 10: 2C2 Ferroalloys production

81. During the review, the ERT tried to verify the information provided in the IIR that all emissions regarding 2.C.2 are included in NFR code 1.A.2.a, 2.C.1 and 2.A.3, and that the use of the notation key "NE" for the activity data in the NFR tables, and the use of the notation key "NO" in the CRF tables is correct. The UK provided the ERT with a comprehensive response and the ERT commends the UK on that. The ERT recommends that the UK revises the use of the notation keys for this source category to ensure consistency between NFR and CRF tables for the next submission.

Category issue 11: 2C3 Aluminium production

82. The ERT asked the UK to provide activity data on a separate level for primary and secondary aluminium production and also to provide an explanation for the drop in HCB emission in 1999. The ERT recommends that the UK includes all provided information and explanation in its IIR for the next submission to ensure better understanding of the time series and existing outliers.

Category issue 12: 2C4 Magnesium production

83. The ERT asked the UK to provide an explanation for the trend in PCDD/PCDF emissions and for the cause of the significant spike in 1997 and for the constant decline during the period 2001 - 2009. The UK provided reasonable explanations and the ERT recommends that the UK includes all provided explanations in the IIR for the next submission.

Category issue 13: 2C7c Other metal production

84. The ERT asked the UK to provide information on the activities that are included within the scope of NFR code 2.C.7.c. The UK provided information regarding these specific activities and the ERT recommends that the UK includes all information provided in the IIR for the next submission to ensure transparency.

Category issue 14: 2D3b Road paving with asphalt

85. The ERT asked the UK to provide an explanation for the confidentiality with regard to road paving with asphalt. The UK stated that it is an error and that the activity data on bitumen are not confidential. The ERT commends the UK for providing the activity data and recommends that the UK includes activity data on bitumen for the full time series to ensure completeness of the NFR tables.

Category issue 15: 2H1 Pulp and paper industry

86. The ERT found that the emission trend of NH3 for the paper and pulp industry is constant over the full period 1990-2014 at a level of 0.005 kt and asked for an explanation. The UK provided an explanation and the ERT suggests including it in the next IIR submission.

Category issue 16: 2H2 Food and beverages industry

87. The ERT asked the UK to provide activity data for food and drink on a dis-aggregated level that includes all NAEI source categories as in the UK IIR and also to explain the trend of NMVOC emission and activity data. The UK provided all requested information and the ERT commends the UK for that effort.

Category issue 17: 2H3 Other industrial processes

88. The ERT asked the UK to provide information on which activity is observed in the scope of NFR code 2.H.3. The UK provided the information and the ERT suggests that the Party includes a short explanation in the next IIR.

Category issue 18: 2I Wood processing

89. The ERT asked the UK to provide an explanation for the drop in NMVOC emission in 1998. The UK provided a comprehensive explanation and the ERT commends the UK for that effort and suggests including the provided explanation in the next IIR to ensure transparency.

Category issue 19: 2K Consumption of POPs and heavy metals

90. The ERT asked the UK to provide an explanation for the drop in PCDD/PCDF and PCBs emissions in 2000. The UK provided a comprehensive explanation and the ERT suggests including the provided explanation in the next IIR to ensure transparency.

SOLVENTS

Review Scope

Pollutants Reviewed		NMVOC, NH3, PM2.5, PM10, TSP		
Years		1990 – 2014		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
2D3a	Domestic solvent use including fungicides	x		
2D3d	Coating applications	x		
2D3e	Degreasing	x		
2D3f	Dry cleaning	x		
2D3g	Chemical products	x		
2D3h	Printing	x		
2D3i	Other solvent use	x		
2G	Other product use	NA		x

General recommendations on cross-cutting issues

Transparency

91. The ERT notes that compared to the previous review in 2010, the UK has included a solvents sector chapter in the IIR, which allows a basic understanding of the sector. However, it does not give any source-by-source insight into what kind of emission factors and methodologies are used for NMVOC emission calculations. During the current review, the UK provided the ERT with some activity data and emission factors used for domestic solvent use and degreasing. The ERT encourages the UK to give a more thorough overview of the solvent sector in the IIR with used activity data, emission factors, methodology and explanations of emission trends for better transparency.

Completeness

92. According to the information given in Table 4-2 of the IIR 2016, the ERT assumes that all the major anthropogenic sources of emission are included in the inventory.

93. The ERT encourages the UK to also include pollutant emissions from NFR sector 2.G Other product use. The ERT notes that emission factors for the use of shoes, tobacco and fireworks are provided in the EMEP/EEA 2013 Guidebook.

Consistency including recalculation and time series

94. The ERT finds the time series of the solvents sector to be generally consistent.

95. The ERT notes that according to the IIR, the UK has made two recalculations in 2016 for coating application and for degreasing. For coating application, emissions increased by 4.2% and for degreasing NMVOC emissions decreased by 38.8%. The

decrease is explained as a revision of the assumed level of control of emissions from the use of solvents. Since the UK has not provided any specific methodological explanation for that in the IIR, it is not possible for the ERT to assess whether the recalculation is justified or not. The ERT recommends that the UK explains the recalculations of emissions in more detail if they result in a major change in emission estimates.

Comparability

96. The ERT infers from the UK's answers during the review that the UK uses country specific emission factors for most of the solvent-related NMVOC emission calculations. Since no detailed methodological information is given in the IIR, it is very hard for the ERT to assess the methods used.

Accuracy and uncertainties

97. The ERT notes that the UK has performed uncertainty analyses for both NMVOC and Particulate Matter only for the NFR sector 2.D as a whole. No specific sub-sector uncertainty analysis has been provided in the IIR.

98. The ERT notes that the UK has comprehensive QA/QC procedures in place.

Improvement

99. The UK explained in the IIR that emission estimates for the NFR 2.D.3 source are largely based on data gathered over many years on an ad-hoc basis from operators, trade associations, and regulators. Very little of that information has been gathered during the last 5 years. As a result, the quality of the NMVOC inventory has slowly deteriorated due to the need to extrapolate from increasingly old data. The UK stated that the solvents sector has therefore become a priority area for improvement. The ERT encourages the UK to continue with the data quality improvements of the solvents sector.

Sub-sector Specific Recommendations

Category issue 1: 2G Other product use – NOx, NMVOC, $PM_{2.5}$, PM_{10}, TSP, BC, PCDD/F, PAHs

100. The sector Other product use (NFR 2G) includes activities such as the use of fireworks, the use of tobacco and the use of shoes. EFs for the corresponding pollutants are given in the EMEP/EEA 2013 Guidebook. Pollutant emissions from these activities are unlikely to be significant with regard to the whole air emissions inventory, but the ERT still encourages the UK to try to estimate pollutant emissions from these activities, ensuring that all anthropogenic sources of emission are included in the inventory.

AGRICULTURE

Review Scope

Pollutants Reviewed		All pollutants		
Years		1990 – 2014		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
3B1a	Dairy cattle	x		x
3B1b	Non-dairy cattle	x		x
3B2	Sheep	x		x
3B3	Swine	x		x
3B4a	Buffalo	NO		
3B4d	Goats	x		x
3B4e	Horses	x		x
3B4f	Mules and asses	NA, IE		x
3B4gi	Laying hens	x		x
3B4gii	Broilers	x		x
3B4giii	Turkeys	x		x
3B4giv	Other poultry	x		x
3B4h	Other animals	x		x
3Da1	Inorganic N-fertilizers (includes also urea application)	x		
3Da2a	Animal manure applied to soils	x		
3Da2b	Sewage sludge applied to soils	NA		x
3Da2c	Other organic fertilisers applied to soils (including compost)	NA		
3Da3	Urine and dung deposited by grazing animals	x		
3Da4	Crop residues applied to soils	NA		
3Db	Indirect emissions from managed soils	NA		
3Dc	Farm-level agricultural operations including storage, handling and transport of agricultural products	x		x
3Dd	Off-farm storage, handling and transport of bulk agricultural products	NA		
3De	Cultivated crops	NA		x
3Df	Use of pesticides	NA		
3F	Field burning of agricultural residues	NA		x
3I	Agriculture other	NA		
11A	Volcanoes		x	
11B	Forest fires		x	

General recommendations on cross-cutting issues

101. The UK's emission inventory covers NH_3 and PM emissions from livestock production and PM emissions from agricultural operations in the field (NFR 3Dc), which can be considered as the most important agricultural emission sources. The ERT reiterates its recommendation for a further expansion of the emission inventory to include NOx emissions from all agricultural sources as well as NMVOC emissions from 3De. Furthermore, the ERT encourages the Party to include more detailed information in its IIR.

Transparency

102. The UK provides information on the number of animals, livestock sub-categories, N-excretion, manure type, which can be considered the most important values for calculating the emissions from the livestock production. During the review, additional reports and publications were made available and the ERT thanks the UK for providing detailed information. The ERT recommends that the UK includes this information on the methodology descriptions (e.g. the N flow approach), trends, and emission drivers in the IIR to improve transparency.

Completeness

103. The UK estimates emissions of NH_3, NMVOC and PM from livestock production (NFR 3B), NH_3 from 3Da1, 3Da2a, and 3Da3, PM from agricultural operation in the fields and emissions from natural sources are estimated for forest fires (NFR 11B) and other natural emissions (NFR 11C). Emissions are estimated for the full period from 1990 to 2014 except for PM, which is estimated from 2000 to 2014. Thus, the inventory is complete with respect to the most important sources of emissions from agriculture. Some emission sources have been identified as not estimated (see above).

Consistency including recalculation and time series

104. The ERT concludes that the agricultural emissions are generally consistent throughout the time series. No outliers have been identified and the trends for the different pollutants are described in the IIR.

105. The ERT notes that a recalculation of NH_3 emissions has taken place. Because the agricultural sector represents 83 % of the total NH3 emission, the recalculation is likely to include some of the agricultural emission sources. The recalculation is mentioned in the IIR agricultural section “Emissions from agricultural are recalculated when new information on emissions or activity data is obtained that is known to be applicable to previous years.” However, it is not clear whether there has been a recalculation or not and the ERT recommends that the UK explicitly states if a recalculation has taken place and provides a quantification for the relevant emission sources.

Comparability

106. The UK follows the recommendations of the EMEP/EEA Emission Inventory Guidebook and the emissions are represented in the NFR 2014 format.

107. The ERT notes that the UK includes heifers in NFR category 3Ba1 Dairy cattle, which makes it unnecessarily complicated to compare with the default and other countries values. The ERT encourages the party to only include dairy cattle in NFR 3Ba1 and to estimate emissions of heifers in NFR 3B1b instead.

Accuracy and uncertainties

108. The Party described in the IIR that specific QA/QC checks were carried out for the agriculture sector. The ERT commends the UK for the QA/QC checks, which make the submission accurate.

109. During the last review in 2010, the UK stated that a Monte Carlo uncertainty analysis had been carried out to estimate uncertainties and that the uncertainty ranges for the agriculture sector were based on the NARSES model. The ERT encourages the UK to include more information on agricultural uncertainty in the IIR.

Improvement

110. The UK planned to integrate the GHG inventory into the NH_3 inventory mass flow structure, which is related to a series of variables related to livestock production such as housing period, proportion of manure type and management. During the review, the UK explained that Nitrogen excretion values are currently being reassessed under the Defra-funded project SCF0103 (Improving the energy value of feeds and diets representative of feeding conditions for ruminant production), the results of which are expected in October 2016.

Sub-sector Specific Recommendations

Category issue 1: 3B and 3D - NOx

111. The ERT notes that no NOx emission has been estimated for the agricultural sector (NFR 3B and 3D), although a Tier 1 methodology is provided in the 2013 Guidebook. The ERT commends the UK for its response "we can raise this with UK Defra as a potential area of improvement for the UK Inventory since it has been raised during the review process" and recommends that the UK starts estimating NOx emissions for the agricultural sector.

Category issue 2: 3B Manure management - all pollutants

112. The IIR contains very little information on national values of N-excretion. During the review, the ERT received reports documenting N-excretion based on references from 2006, but the UK also remarked that these values were being reassessed. The ERT recommends that the Party includes more information and references in the IIR regarding N-excretion and especially focuses on explaining why values differ significantly from the default values, e.g. for sows.

113. The ERT notes an inconsistency in the number of cattle. IIR Table 5-3 mentions 1,841,000 dairy cattle and 1,569,000 non-dairy cattle, while the NFR shows 3,294,000 dairy cattle and 6,543,000 non-dairy cattle. The total number of cattle matches but the allocation differs. The ERT encourages the UK to allocate only dairy cattle to NFR category 3B1a.

114. The UK informed the ERT that abatement practices in housing, manure storage and manure spreading were taken into account in the emission inventory but

no references are mentioned. The party provided information on manure management (manure type, housing type, storage conditions, and spreading conditions) during the review. The ERT recommends that the UK includes information on which abatement practice is included, on the reduction effect and how the reduction influences the trend into the IIR.

Category issue 3: 3D Agricultural Soils - all pollutants

115. The ERT asked for information on the estimation of emissions from field burning. The UK responded that the Crop Residues (Burning) Regulation came into force in 1993 and has reported emissions of NO, NMVOC, PM, BC and CO from 1990 to 1993. The UK also explained that Muirburn current takes place, which is "…land that is being burned to help wild grouse chicks find young shoots easily on remote upland areas". The ERT agrees that it would be appropriate to include this emission source in NFR 11B Forest fires.

116. The ERT asked for more information to understand how the PM emissions from farm-level agricultural operations (NFR 3Dd) are estimated and UK responded that this information would be included in future editions of the IIR.

117. The ERT notes that no NMVOC emission is estimated for cultivated crops (NFR 3De) and encourages the UK to estimate this emission source based on the Tier 1 approach presented in the guidebook.

Category issue 4: 3Df Field Burning - PAH and HCB

118. During the review, the ERT questioned the use of the notation keys "NA" for field burning (NFR 3.F). The UK explained that burning of linseed and disposal of broken bales and the remains of straw stacks is exempted from the ban which came into force in 1993 and further answered that "any emissions will be extremely small and hence it may be considered that 'relevant emissions are considered never to occur'." The ERT agrees that for many of the pollutants the emission will be low. However, the emission of PAH and HCB could be relevant. Denmark also has a ban on burning with the exception of cultivation of grass seeds and broken bales and the emission of PAH and HCB accounts for 4-5% of the national total. The ERT encourages the UK to consider estimating this emission source.

WASTE

Review Scope

Pollutants Reviewed		All pollutants		
Years		1990 – 2014		
Code	**Name**	**Reviewed**	**Not Reviewed**	**Recommendation Provided**
5A	Solid waste disposal on land	x		x
5B1	Biological treatment of waste - Composting	x		
5B2	Biological treatment of waste - Anaerobic digestion at biogas facilities		x	
5C1a	Municipal waste incineration	x		
5C1bi	Industrial waste incineration	x		
5C1bii	Hazardous waste incineration	x		
5C1biii	Clinical waste incineration	x		
5C1biv	Sewage sludge incineration	x		
5C1bv	Cremation	x		
5C1bvi	Other waste incineration		x	
5C2	Open burning of waste	x		
5D1	Domestic wastewater handling	x		x
5D2	Industrial wastewater handling	x		x
5D3	Other wastewater handling		x	
5E	Other waste	x		x

General recommendations on cross-cutting issues

119. The waste inventory of the UK under CLRTAP is largely transparent, accurate, consistent, complete and comparable. It presents emissions for major pollutants and activities as well as trends, recalculations and planned improvements. The UK applies well-developed methodologies in line with the EMEP/EEA Guidebook. Underlying data and country-specific emission factors are referenced. However, some recommendations and encouragements were made to improve transparency, completeness and comparability of reporting.

Transparency

120. The UK's submission is transparent. Methodologies, trends and references are provided, although some questions were raised during the review to fully understand the methodologies and data used. The ERT commends the UK for its responsiveness and the detailed information provided during the review and encourages the Party to consider ways of improving transparency in reporting on the issues raised.

Completeness

121. The ERT considers the UK inventory on waste as generally complete. Emissions for major pollutants and major activities are provided. However, some small sources and pollutants on 5.D wastewater are missing and are recommended to be included in future submissions. Please find further information in the respective sector-specific section.

Consistency, including recalculation and time series

122. The ERT considers the emissions and the methodologies applied by the UK to be consistent.

Comparability

123. Methodologies and emission factors were well explained in the IIR and during the review. A comparison with other Parties, however, is only feasible to a limited extent as the UK largely uses country-specific approaches and emission factors, including facility-specific emissions.

Accuracy and uncertainties

124. The UK reports on source-specific QA/QC and verification in its IIR. The ERT commends the Party for providing this information.

Improvement

125. The ERT commends the UK for following the recommendations from the previous Stage 3 review in 2010 and encourages the Party to continue with further improvements.

126. The UK has included sections on recalculations and planned improvements in its sectoral chapter on waste. The ERT commends the Party for its detailed reporting.

Sub-sector Specific Recommendations

Category issue 1: 5A Solid waste disposal – all pollutants

127. The UK provides emissions of several pollutants from 5.A solid waste disposal. The trend of landfilled waste and emission factors for NMVOC, benzene, 1,3-butadiene as well as particulate matter are well described in the IIR. The emission factors for NH_3, Hg, PCDD/PCEF and PCB as well as the underlying activities are, however, not stated in the IIR. In response to a question by the ERT, the Party gave detailed information on the activity data used as well as emission factors applied. The Party also provided information about using different types of activity data (t landfilled, kg/inhabitant, CH_4 flared, CH_4 escaped) for the calculation of different pollutant's emissions. The ERT commends the UK for its refined approach and for providing this comprehensive information during the review and recommends that the Party elaborates more clearly on the types and amounts of activity data used and clearly states the respective EF applied in its next IIR.

Category issue 2: 5B Biological treatment of waste – NH3

128. The ERT commends the UK for applying a country-specific methodology based on actual waste flows for non-household composting and applying a country-specific emission factor for household composting. In response to a question by the ERT, the UK provided the exact data origins for non-household and household composting. The ERT commends the UK for having provided details during the

review and recommends that the UK includes these in the IIR. Moreover, it has been revealed that mechanical-biological treatment processes are currently not covered, although emissions are to be expected during the biological treatment step. The ERT commends the Party for taking this issue up in the improvement plan for the next inventory.

129. In response to a question by the ERT, the UK has provided a good explanation for the strong increase in trend of emissions from composting (with reference to the Landfill Directive). The ERT commends the Party for this elaboration and encourages the UK to include this information in the next IIR.

Category issue 3: 5C Waste incineration – all pollutants

130. The ERT commends the Party for its improvements in transparency made since the previous Stage 3 review in 2010. Reporting on methodological issues with regard to waste incineration, covering municipal solid waste, chemical waste, clinical waste, sewage sludge and animal carcasses, is comprehensive and references are given. Many of the emissions reported under waste incineration are based on facility reporting, but own estimates using literature-based emission factors are also made. The ERT encourages the UK to provide more detailed information on that in the IIR, e.g. by indicating in which order of magnitude emissions are based on reporting (e.g. E-PRTR), and on own calculations, respectively. During the review, the Party provided the ERT with a detailed list of AD and EF applied. The ERT commends the UK for providing this information for review.

131. The UK reports on PCB emissions from 5.C.2 open burning of waste. During the review, the Party has provided detailed information on types and amounts of activity data as well as the respective emission factors used. The ERT commends the Party for its responsiveness.

132. The ERT commends the UK for including Pb, Cu, Zn and Ni emissions from clinical waste incineration using default emission factors and making this progress in reporting since the previous Stage 3 review.

Category issue 4: 5D Wastewater handling - NMVOC, NH_3

133. There are no NMVOC emissions reported under 5.D. wastewater handling in the UK inventory. However, NMVOC emissions from wastewater treatment plants are to be expected during the biological treatment stage. The ERT reiterates its encouragement from the previous Stage 3 review and recommends that the UK estimates NMVOC emissions from wastewater handling and reports them in its future submissions.

134. The UK estimates NH_3 emissions from sewage sludge applied to land and reports them under NFR category 5.D.1. However, other Parties report emissions from spreading of sewage to agricultural land under the agriculture sector (3.D.a.2.b sewage sludge applied to soils) and not under the waste sector. The ERT has noticed that no emissions are reported under 3.D.a.2.b in the NFR (“NA”). In response to questions by the ERT, the UK confirmed that emissions from sewage

sludge spreading are to be re-allocated to the agriculture sector and that emissions from wastewater collection in latrines have to be estimated. The UK announced its plan to include these improvements in its next submission. The ERT commends the Party for that plan and recommends that the UK reports emissions from sludge spreading and latrines under the respective categories.

Category issue 5: 5E Other waste

135. PCDD/PCDF and PCB emissions were reported under 5.E. other waste, but no category and methodological description on this sub-category is provided in the IIR. In response to a question raised by the ERT, the UK informed the ERT that PCB emissions from refuse-derived fuel (RDF) manufacture as well as PCDD/PCDF emissions from the regeneration of active carbon are covered by this category and provided references to data sources. Emissions from accidental fires (vehicles, buildings) are, however, included under 5.A. although the EMEP/EEA 2013 Guidebook provides for reporting of these sources under 5.E. The ERT recommends that the UK includes this information in its next IIR to increase transparency.

LIST OF ADDITIONAL MATERIALS PROVIDED BY UK DURING THE REVIEW

1. Transport Q1: HCB EFs sourced from Table 2-9 of the COPERT report
2. Transport Q4/Q5: trends explanations
3. Energy Q5: activity data on flaring
4. Energy Q7: activity data on waste incineration
5. Industry: Questions UK Industry_01_Activity data
6. Solvents Q1.1: activity data, emission factors, NMVOC emissions from domestic solvent use: Consumer agrochemicals, Consumer aerosols, Consumer non-aerosols
7. Solvents Q3.1: activity data, emission factors, NMVOC emissions from degreasing: Degreasing